CLAIMS

1. A communication device comprising a turbo encoder having

a first reclusive organization convolutional encoder for convolutionally encoding two information bit sequences to output first redundant data; and

a second reclusive organization convolutional encoder for convolutionally encoding the information bit sequences subjected to the interleave process to output second redundant data; and

an interleaver which

stores the information bit sequences in an input buffer of "M (abscissa: prime number)=2^m+1" × "N (ordinate: natural number)=2^m" (m is an integer),

generates random sequences of (M-1) types by shifting a random sequence of a specific (M-1) bit generated by using the prime number bit by bit in units of rows and maps minimum values at Mth bits of respective rows in all the random sequences and makes a mapping pattern of an Nth row equal to that of the first row to generate an M × N mapping pattern,

maps information bit sequences of an interleave length on the M × N mapping pattern, and

reads the mapped information bit sequences in units of columns to output the information bit sequences

to the second reclusive organization convolutional encoder.

2. The communication device according to claim 1, wherein the interleaver, when the two information bit sequences are stored in the input buffer, replaces at least one row such that an inter-signal-point distance of the information bit sequences is not 0.

3. The communication device according to claim 1, wherein the interleaver forms a latin square pattern in a buffer of (M-1) × (N-1) as random sequences of the (M-1) types.

4. The communication device according to claim 1, wherein the interleaver determines N to satisfy "N (ordinate: natural number) ≥ 2^m+1".

5. The communication device according to claim 1, wherein the interleaver maps maximum values at the starts of all the rows in random sequences of the prime number (M-1), and makes a mapping pattern of an Nth row equal to a mapping pattern of the first row to generate an M × N mapping pattern.

6. The communication method which rearranges two information bit sequences in a turbo encoder, comprising:

the bit sequence storing step of storing the

information bit sequences in an input buffer of "M (abscissa: prime number)=2^m+1" × "N (ordinate: natural number)=2^m";

the mapping pattern generation step of generating random sequences of (M-1) types by shifting a random sequence of a specific (M-1) bit generated by using the prime number bit by bit in units of rows, mapping minimum values at Mth bits of respective rows in all the random sequences, and making a mapping pattern of an Nth row equal to that of the first row to generate an M × N mapping pattern;

the mapping step of mapping information bit sequences of an interleave length on the M × N mapping pattern; and

the bit sequence read step of reading the mapped information bit sequences in units of columns.

7. The communication method according to claim 6, wherein, in the bit sequence storing step, when the two information bit sequences are stored in the input buffer, at least one row is replaced such that an inter-signal-point distance of these information bit sequences is not 0.

8. The communication method according to claim 6, wherein, in the mapping pattern generation step, a latin square pattern is formed in a buffer of (M-1) × (N-1) as random sequences of the (M-1) types.

9. The communication method according to claim 6, wherein N is determined to satisfy "N (ordinate: natural number) $\geq 2^m+1$".

10. The communication method according to claim 6, wherein, in the mapping pattern generation step, maximum values are mapped at the starts of all the rows in random sequences of the prime number (M-1), and a mapping pattern of an Nth row is made equal to a mapping pattern of the first row to generate an M × N mapping pattern.